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The relationship between cellular and calcium responses of Aspergillus awamori to external influences

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Abstract

The cellular and Ca2+ responses to physiological stimuli of different nature were studied in the experiments with the strain Aspergillus awamori 66A containing recombinant aequorin, a Ca2+-dependent photosensitive protein. The relationship between the cellular response registered by changes in the development of the mycelial fungus (colony growth, hyphal branching, and the rate of spore formation) and the level and duration of calcium flares in the cytosol was assessed. The physical or chemical stimuli (mechanical effect, osmotic shock) inducing short-time calcium flares in the cytosol did not influence significantly the development of A. awamori grown in liquid or on solid nutrient media. The action on the 24-h A. awamori culture of the Ca2+-selective ionophore (A23187) inducing long-term changes in calcium homeostasis caused disorders in the fungus development and morphology (hyperbranching of mycelial hyphae, formation of spherical cells, and inhibition of colony growth and spore formation). Thus, it was established that the development of cellular response in the micromycete correlated with the duration of the calcium flare in the cytosol.

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Keywords

Aspergillus awamori, Ca2+ dynamics, Cellular response, Recombinant aequorin, Stress influences